

⁷¹
~~--92~~. A method as claimed in claim ⁶⁸~~88~~, wherein said steps of modulation is multi-level amplitude and/or phase modulation (mQAM).--

⁷²
~~--93~~. A method as claimed in claim ⁷¹~~92~~, wherein said mQAM modulation is one of: multi-level amplitude phase shift keying (mASK), permutation modulation, binary phase shift keying (BPSK), multi-level phase shift keying (mPSK) and multi-level amplitude phase keying (mAPK).--

REMARKS

Claims 1-21 have been canceled herein. New claims 22-93 are in this application.

The drawings were objected to "because boxes 8 and 9 in Figures 4 and 5 need descriptive legends". A Request for Approval of Drawing Changes accompanies this Amendment which adds such descriptive legends.

The Examiner stated that the "serial number missing from page 10, line 20 should be supplied". The present specification has been amended herein so as to provide this information.

Claims 1-21 were rejected under "35 U.S.C. §112, second paragraph". As previously described, claims 1-21 have been canceled and new claims 22-90 have been added herein. Such new claims are believed to overcome the §112 rejections of claims 1-21.

/

Claims 1-3, 5-9, 11-15, 17 and 19-21 were rejected under "35 U.S.C. §103 as being unpatentable over Smith in view [of] Schuchman et al."

Claims 4, 10 and 18 were rejected under "35 U.S.C. §103 as being unpatentable over Smith and Schuchman as applied to claims 1-3, 8, 9, 14 and 17 above, and further in view of Furuya et al."

Claim 16 was rejected under "35 U.S.C. §103 as being unpatentable over Smith and Schuchman as applied to claim 15 above, and further in view of Cutter".

As previously described, claims 1-21 have been canceled and new claims 22-93 have been added herein. Accordingly, the following comments regarding the above-described §103 rejections will be described with reference to new claims 22-93.

The present invention relates to local area networks (LANs) and, in particular, to wireless LANs. Such present wireless LANs may be used in an office-like environment such as that illustrated in Fig. 1 of the present application. As shown therein, and as described in the present application as, for example, on page 6, lines 9-15 thereof, a room 1 of a typical office building includes items such as furniture 2. Such room further includes a transmitter 3 and a receiver 4. The present system is adapted to transmit data at relatively high radio frequencies, such as those in excess of 10 GHz. Utilizing such relatively high radio frequencies and reflections (from walls,

floor and ceiling of the room 1 along with other items such as the furniture 2 contained therein) may cause multipath transmissions. As illustrated in Fig. 2 of the present application, the effect of such multiple path transmissions is that the receiver 4 (Fig. 1) receives an undelayed signal 5 which has travelled directly from the transmitter 3 to the receiver 4, and a number of delayed signals 6 which are received at a time after the receipt of the undelayed signal 5. As a result of such delayed signals 6, the length of time or period of a sub-channel symbol is caused to be longer than a predetermined period or delay time of the significant ones of non-direct transmission paths.

An example of a wireless LAN arrangement of the present invention is illustrated in Fig. 4 of the present application. As shown therein, such arrangement includes a plurality of hubs 8 and a plurality of mobile transceivers 9. The hubs 8 are interconnected by use of a backbone 10 which may be an electrical conductor or an optical fiber cable. Each hub 8 has a limited transmission range and accordingly creates a corresponding cell 13 as illustrated in Fig. 4 of the present application. In a typical arrangement, each office within a building would be provided with a single hub 8 which would communicate with each mobile transceiver 9 in that office or room.

U.S. Patent No. 4,630,314 (Smith) relates particularly to an RF communication system in which a master station

communicates with a plurality of remote stations by reflecting RF signals from meteor trails in the atmosphere. Such system is illustrated in Fig. 1 of Smith. As shown therein, such system includes one or more master stations 10 and a plurality of remote stations 12a-n. The master station 10 includes an RF transmitter 16 "preferably operating in the low VHF range" (col. 5, lines 59 and 60), an RF receiver 18, an antenna transmit/receive switch 20 and a computer 22. The remote station 12 is configured in a similar manner to the master station 10 insofar as it receives and transmits messages under computer control. The remote stations 12 include respective transmitters 40 "operating at the same frequency as the receiver 18 of the master station 10", and an RF receiver 42 "operating at the same frequency as the transmitter 16 of the master station 10" (col. 6, lines 19-22). The remote stations 12 further include a conventional antenna transmit/receive switch 44 and a computer 46.

U.S. Patent No. 5,283,780 (Schuchman et al.) relates to a digital audio broadcasting system that is asserted as being capable of providing a large number of stereophonic channels to receivers. Such system is apparently intended for communication between a satellite and a station on earth. Fig. 1 of Schuchman illustrates the coding of 33 channels and multiplexing "within a roughly 10 MHz bandwidth of an L-band broadcast beacon" (col. 6, lines 20 and 21). As shown in Fig. 1 of Schuchman, such arrangement generally includes a conventional source encoder, a

convolutional encoder 10, a block symbol interleaver 11, a frequency interleaver 12 and a modulator 13 as described in Schuchman from col. 6, line 22 to col. 7, line 27. Fig. 5 of Schuchman illustrates a mobile receiver which is described in Schuchman from col. 8, line 41 to col. 9, line 8.

Accordingly, there are substantial distinctions between the present invention and either of Smith or Schuchman. That is, neither Smith nor Schuchman appears to apply to a wireless LAN which may operate within a room of an office building or the like, unlike the present invention. Instead, the system of Smith apparently operates over relatively large distances and utilizes meteor trails in the atmosphere for communicating between a master station and remote stations; and the system of Schuchman also apparently operates over very large distances by communicating between a satellite and a station on earth. Further, neither Smith nor Schuchman appears to transmit and/or receive data at relatively high radio frequencies such as those in excess of 10 GHz as in the present invention. Instead, the system of Smith apparently transmits and receives data at relatively low frequencies such as those in the "low VHF range" as previously described, and the system of Schuchman apparently operates "within a roughly 10 MHz bandwidth of an L-band broadcast beacon" with a channel data rate of 256 Kbps (see col. 6, lines 20-22 of Schuchman). Furthermore, neither Smith nor Schuchman appears to describe processing data such that the

period of a sub-channel symbol is longer than a predetermined period representative of a time delay of significant ones of non-direct transmission paths as in the present invention.

Each of the new independent claims 22, 31, 38, 47, 54, 63, 70, 77, 82 and 89 include at least one of the above-described distinctions between the present invention and Smith and Schuchman.

The present invention, as defined in new independent claim 22, is distinguishable from either Smith or Schuchman, in that, neither Smith nor Schuchman appears to disclose modulation means "for modulating input data of said input data channel into a plurality of sub-channels comprised of a sequence of data symbols such that the period of a sub-channel symbol is longer than a predetermined period representative of the time delay of significant ones of non-direct transmission paths" as in claim 22. Further, neither Smith nor Schuchman appears to disclose each transceiver being operable to transmit and receive data at radio frequencies "in excess of 10 GHz" as in claim 22. Furthermore, neither Smith nor Schuchman appears to describe radio transmissions "in a confined multipath environment" as in claim 22. Additionally, neither Smith nor Schuchman appears to relate to a wireless LAN, unlike the present invention of claim 22. Moreover, Schuchman does not appear to describe a "plurality of mobile transceivers" as in claim 22.

For reasons similar to those described above with regard to claim 22, the present invention as defined in new independent claim 31 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a "wireless LAN", radio transmissions "in a confined multipath environment", and modulation means as in claim 31.

For reasons similar to those described above, the present invention as defined in new independent claim 38 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose radio transmissions "in a confined multipath environment", each transceiver being operable to transmit and receive data at radio frequencies "in excess of 10 GHz", and modulation means. Further, neither Smith nor Schuchman appears to relate to a "peer-to-peer wireless LAN" as in claim 38.

For reasons similar to those previously described, the present invention as defined in new independent claim 47 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a "peer-to-peer wireless LAN", radio transmissions "in a confined multipath environment", and modulation means as in claim 47.

For reasons similar to those previously described, the present invention as defined in new independent claim 54 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a transceiver operating "in a

confined multipath transmission environment", the transceiver being operable to transmit and receive data at radio frequencies "in excess of 10 GHz", and modulation means as in claim 54.

For reasons similar to those previously described, the present invention as defined in new independent claim 63 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a transceiver for operation "in a confined multipath transmission environment" and modulation means as in claim 63.

For reasons similar to those described above, the present invention as defined in new independent claim 70 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a transmitter for operation "in a confined multipath transmission environment", the transmitter being operable to transmit data at radio frequencies "in excess of 10 GHz", and modulation means as in claim 70.

For reasons similar to those described above, the present invention as defined in new independent claim 77 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a transmitter for operation "in a confined multipath transmission environment" and modulation means as in claim 77.

For reasons similar to those described above, the present invention as defined in new independent claim 82 is distinguishable from Smith and Schuchman, in that, neither Smith

nor Schuchman appears to disclose a method for transmitting data "in a confined multipath transmission environment at radio frequencies in excess of 10 GHz", a step of modulating the data by "modulation means", and the step of transmitting sub-channel symbols at radio frequencies "in excess of 10 GHz" as in claim 82.

For reasons similar to those described above, the present invention as defined in new independent claim 89 is distinguishable from Smith and Schuchman, in that, neither Smith nor Schuchman appears to disclose a method for transmitting data "in a confined multipath transmission environment" which includes the step of modulating the data by "modulation means" as in claim 89.

The Examiner relied upon U.S. Patent No. 4,888,767 (Furuya et al.) only in an attempt to meet the limitations of original claims 4, 10 and 18. Similarly, the Examiner relied upon U.S. Patent No. 3,605,019 (Cutter et al.) only in an attempt to meet the limitations of original claim 16. In any event, Furuya and Cutter do not appear to cure the aforementioned deficiencies of Smith and Schuchman.

Claims 23-30, 32-37, 39-46, 48-53, 55-62, 64-69, 71-76, 78-81, 83-88 and 90-93 are dependent either directly or indirectly from one of independent claims 22, 31, 38, 47, 54, 63, 70, 77, 82 and 89 and, as such, respectively incorporate all of the above-mentioned limitations contained therein. Therefore,

claims 23-30, 32-37, 39-46, 48-53, 55-62, 64-69, 71-76, 78-81, 83-88 and 90-93 are also patentably distinguished from the applied references for the reasons previously discussed.

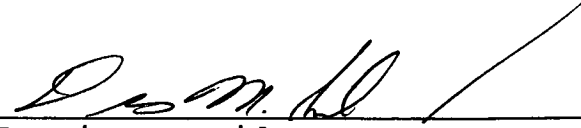
The Examiner has made of record, but not applied, U.S. Patent No. 4,679,227 to Hughes-Hartogs, U.S. Patent No. 5,095,535 to Freeburg, and U.S. Patent No. 5,191,576 to Pommier et al. The applicants appreciate the Examiner's implicit finding that these references, whether considered alone or in combination with others, do not render the claims of the present application unpatentable.

It is to be appreciated that the foregoing comments concerning the disclosures in the cited prior art represent the present opinions of the applicants' undersigned attorney and, in the event that the Examiner disagrees with any such opinions, it is requested that the Examiner indicate where in the reference or references, there is a basis for a contrary view.

In view of the foregoing amendments and remarks, it is believed that all of the claims in this application are patentable over the prior art, and an early and favorable consideration thereof is solicited.

Respectfully submitted,

CURTIS, MORRIS & SAFFORD, P.C.
Attorneys for Applicants


Dennis M. Smid
Reg. No. 34,930
(212) 840-3333